CHAPTER 4

Communications

PRINCIPLES AND DEVELOPMENTS IN COMMUNICATIONS SYSTEMS

Ensured, secure communications are essential for effective command and control. The ASB relies on its organic communication assets and on support from the division signal battalion. The length of CSS transmissions and the crowding in the division rear mandate that commanders maximize use of burst transmission devices, couriers, and wire communications. This lessens the security risk of substantial radio use.

Communications systems in the corps and division are changing. The MSE system will replace the current area communications system described below. The single-channel ground and airborne radio system (SINCGARS) and improved high-frequency radios will replace current FM (AN/VRC -12-series) radios.

These changes will affect the ASB in the connectivity to the area system. Under the current system, the command operations company of the division signal battalion runs wire to the ASB switchboard. When using MSE, the ASB will run wire from unit locations to the MSE node. The amount of wire the ASB headquarters and companies will need depends on what is authorized by modification table(s) of organization and equipment (MTOE). The unit SOP will cover wire laying for all units with the deployment of MSE. It must cover who does it and in what priority. The actual communications means will remain essentially the same. The ASB will depend on couriers, combat net radios, and wire access to area communications systems. Automated hardware systems will subscribe to the area communication systems by wire or wireless access.

CURRENT AREA SYSTEM

Figure 4-1, page 4-2 shows a sample current area communications system. The ASB headquarters and companies use their organic switchboards and telephones for internal wire communications. The ASB will normally tie into the area communications system (signal battalion multichannel system) at the command operations company of the division signal battalion. The companies will tie into the ASB switchboard or directly into the signal battalion switchboard to gain access into the area system.

When the MSE system replaces the current area system, the organic two-wire switchboards and telephones will not be capable of entering the four-wire digital system. The ASB and its companies will retain the two organic switchboards for area security and internal operations.
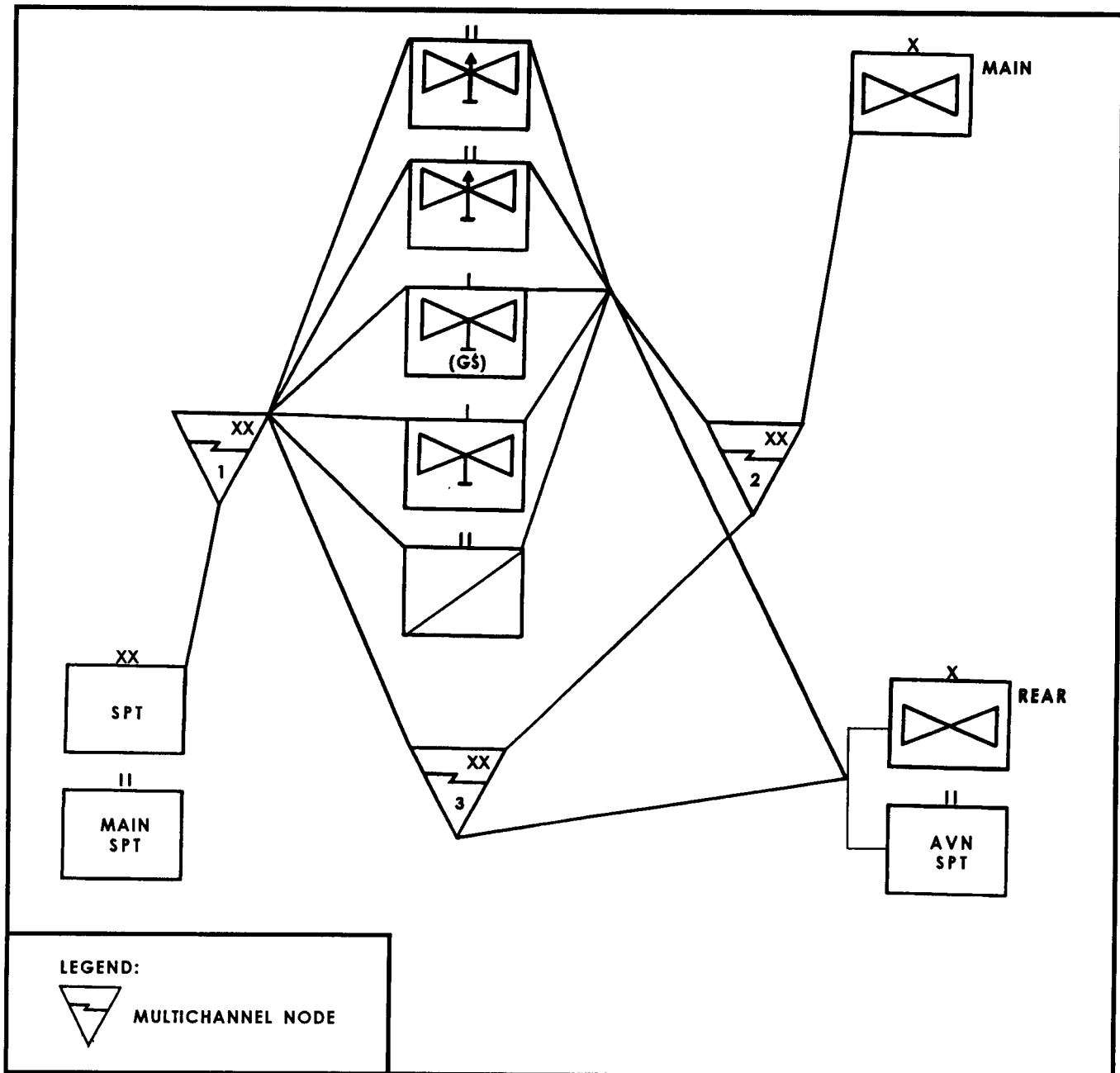

Figure 4-1. Sample heavy division aviation brigade multichannel diagram (current area system)

MOBILE SUBSCRIBER EQUIPMENT AREA
COMMUNICATIONS SYSTEM

MSE is the area common-user voice communication system within the corps. It will deploy from the corps rear boundary forward to the maneuver battalion main CP.

AREA COVERAGE

Area coverage means that MSE provides common-user support to a geographic area, as opposed to dedicated support to a specific unit or customer.

Figure 4-2 shows a sample deployment of area nodes across a corps area. These nodes are called node centers. They are under the control of the Signal Corps. Figure 4-3, page 4-4 shows a node center.

LEGEND:

⬡ NODE CENTER
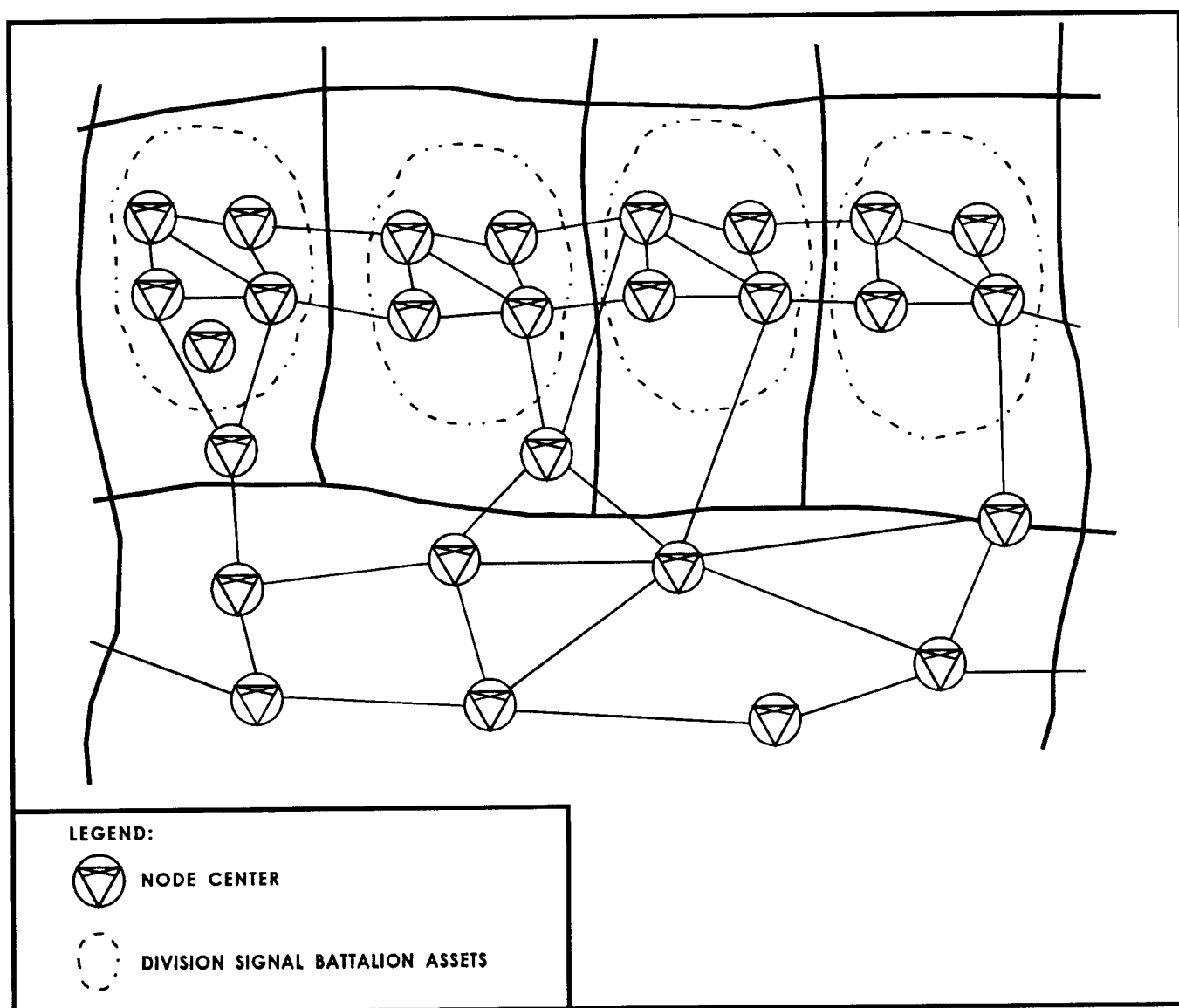
⌐ ⌐ DIVISION SIGNAL BATTALION ASSETS

Figure 4-2. Representative deployment of area nodes (MSE)

At the division level, the signal battalion operates four of these nodes. Connected to the nodes by line-of-sight radios are small extension nodes (SENs) and large extension nodes (LENs). In the division signal battalion these include—

• 12 SEN (VI) switchboards capable of supporting 26 customers each.

• 4 SEN (V2) switchboards capable of supporting 41 customers each.

• 1 LEN switchboard capable of supporting 176 customers.

A typical deployment of aviation brigade switchboards within the division is shown in Figure 4-4. Tactical dispersion requirements require the ASB to tie into a SEN. Figure 4-4 is only one approach. The G3 will determine the location of switchboards based on the recommendation of the division Signal Officer. The Signal Officer considers the commander's intent, customer requirements, and other factors of METT-T. Switchboard location will not be tied to specific units.
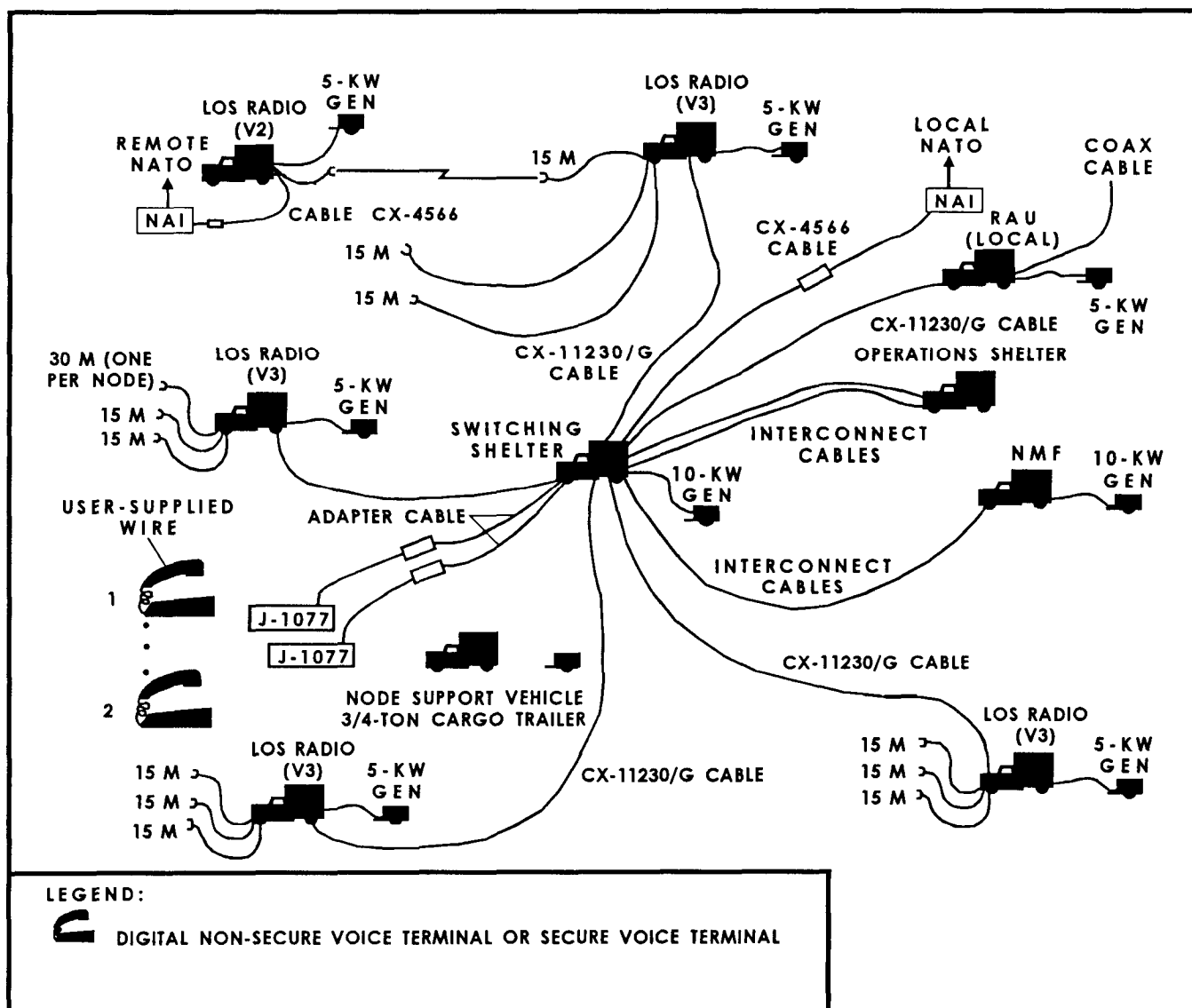

Figure 4-3. Node center

Figure 4-4. Typical aviation brigade deployment of SEN and LEN switchboards

WIRE SUBSCRIBER ACCESS

Wire subscriber access points provide the entry points (interface) between fixed subscriber terminal equipment (owned and operated by users) and the MSE area system (operated by signal units).

ASB users tie into the area system through MSE switchboards. The two types of interface equipment are the—
• Signal distribution panel (junction box) J-1077, which provides up to 13 subscriber access points.
• Remote multiplexer combiners (RMCs) which provide access for 8 subscriber access points.

Normally, the ASB will interface through the panel. In either case, the ASB is responsible for installing and operating fixed subscriber terminal instruments. It must also install and maintain WF-16 field wire from the instruments to the interface points. WF-16 wire consists of two pairs of wire—one olive drab, the other brown. The olive drab pair has a ridge along the side for night identification.

FIXED SUBSCRIBER TERMINALS

Subscriber terminals used by the ASB are digital, nonsecure voice telephones. These provide full-duplex, digital, four-wire voice capability. They also have a data port for interfacing the AN/UXC-7 facsimile for informal record traffic; the TACCS for CSS STAMISs; and the unit-level computer, as shown in Figure 4-5. The terminals also provide the interface for the ASB to enter the ATCCS. Figure 4-6, page 4-8 portrays the assignment of digital, nonsecure voice telephone (DNVT), facsimile, ATCCS, and unit-level computers (ULCs) for the ASB. The DNVT ties into the area system through a panel or RMC.

MOBILE SUBSCRIBER TERMINAL

The MSE mobile subscriber terminal is the AN/VRC-97 mobile subscriber radiotelephone terminal (MSRT).

The MSRT is a vehicle-mounted assembly consisting of a very high-frequency radio and a digital secure voice terminal. It interfaces with the MSE system through a radio access unit. Figure 4-6, page 4-8 represents assignment of MSRTs in the ASB. The primary use of the MSRT is to provide mobile subscribers access to the MSE area network. Figure 4-7, page 4-9 is a typical MSRT interface into the area system. Radio access units (RAUs) are used for maximum area coverage and MSRT concentration. Staff and fictional personnel operating in CPs can also access MSRTs. The MSRT user will have a KY68 telephone connected to the radio mount in the vehicle. As long as the radio unit has line-of-sight contact with the RAU, it is connected to the area system. The operational planning range is 15 kilometers from any RAU.

COMBAT NET RADIO SYSTEM

The combat net radio (CNR) structure is designed around three separate radio systems; each has different capabilities and transmission characteristics:
• Single-channel, objective tactical terminal.
• Improved high-frequency radio.
• Single-channel ground and airborne radio.

SCOTT is a stand-alone, transportable, tactical satellite communications terminal that will be transparent to the ASB. If couriers and the MSE system cannot meet data transfer requirements, IHFR and SINCGARS will provide a means for voice transmission of C2 information and for data transmission. Current CNR equipment in the ASB consists of the AN/VRC-12-series radios. These will be replaced by the AN/GRC-213 and SINCGARS series. The AN/GRC-213 is a low-power manpack/vehicular radio. It interfaces with the other configurations of the IHFR system. SINCGARS is a new family of VHF-FM radios. These radios operate quickly and simply, using a 16-element keypad for push-button tuning. They are capable of short-range or long-range

operation for voice or digital data communications. The planning range is 8 to 35 kilometers. They are capable of a single-channel operation for interface with the AN/VRC-12 series or other FM radios operating in a single-channel mode. They also operate in frequency-hopping mode, which the operator changes as needed.
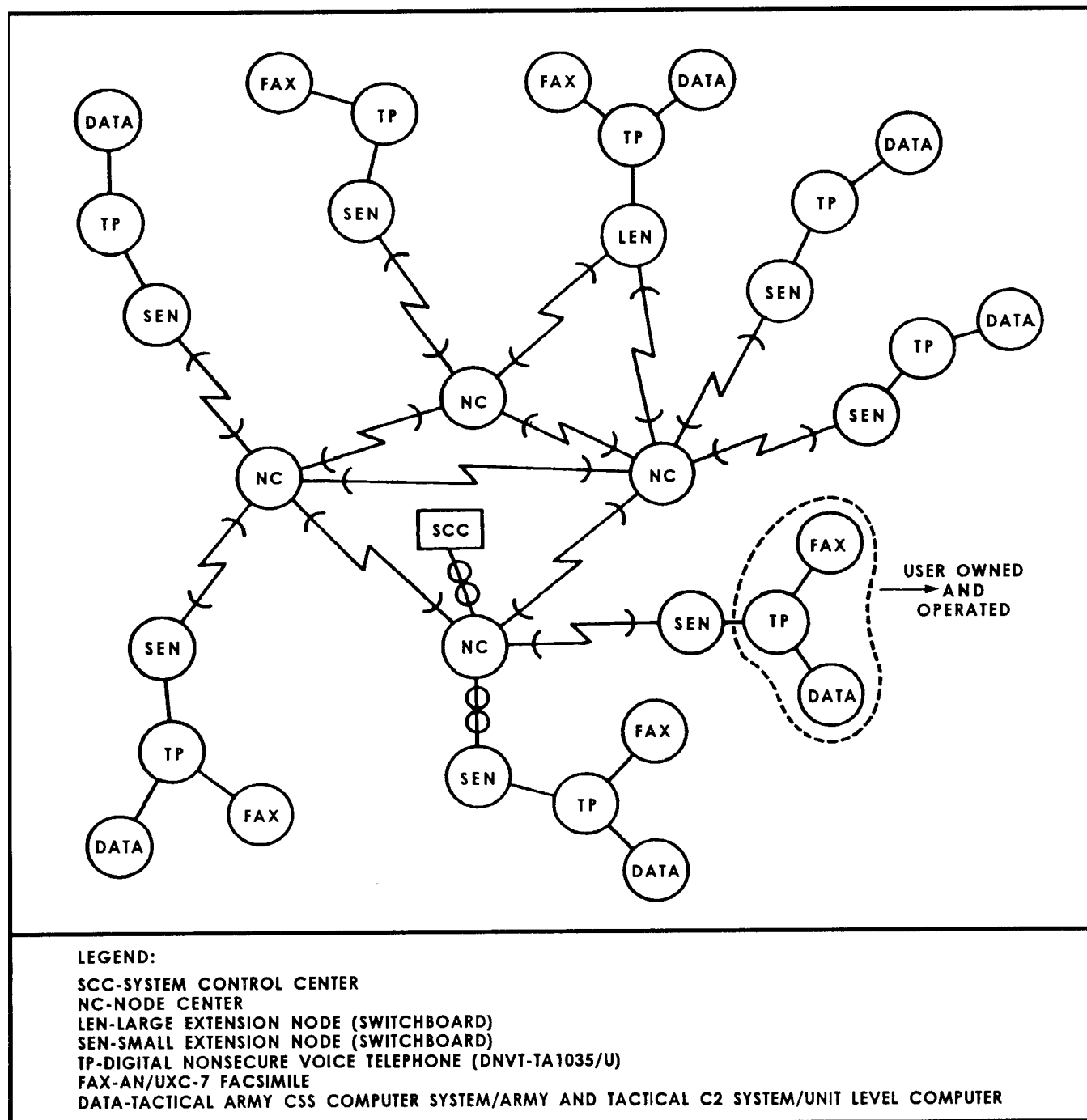

LEGEND:
SCC-SYSTEM CONTROL CENTER
NC-NODE CENTER
LEN-LARGE EXTENSION NODE (SWITCHBOARD)
SEN-SMALL EXTENSION NODE (SWITCHBOARD)
TP-DIGITAL NONSECURE VOICE TELEPHONE (DNVT-TA1035/U)
FAX-AN/UXC-7 FACSIMILE
DATA-TACTICAL ARMY CSS COMPUTER SYSTEM/ARMY AND TACTICAL C2 SYSTEM/UNIT LEVEL COMPUTER

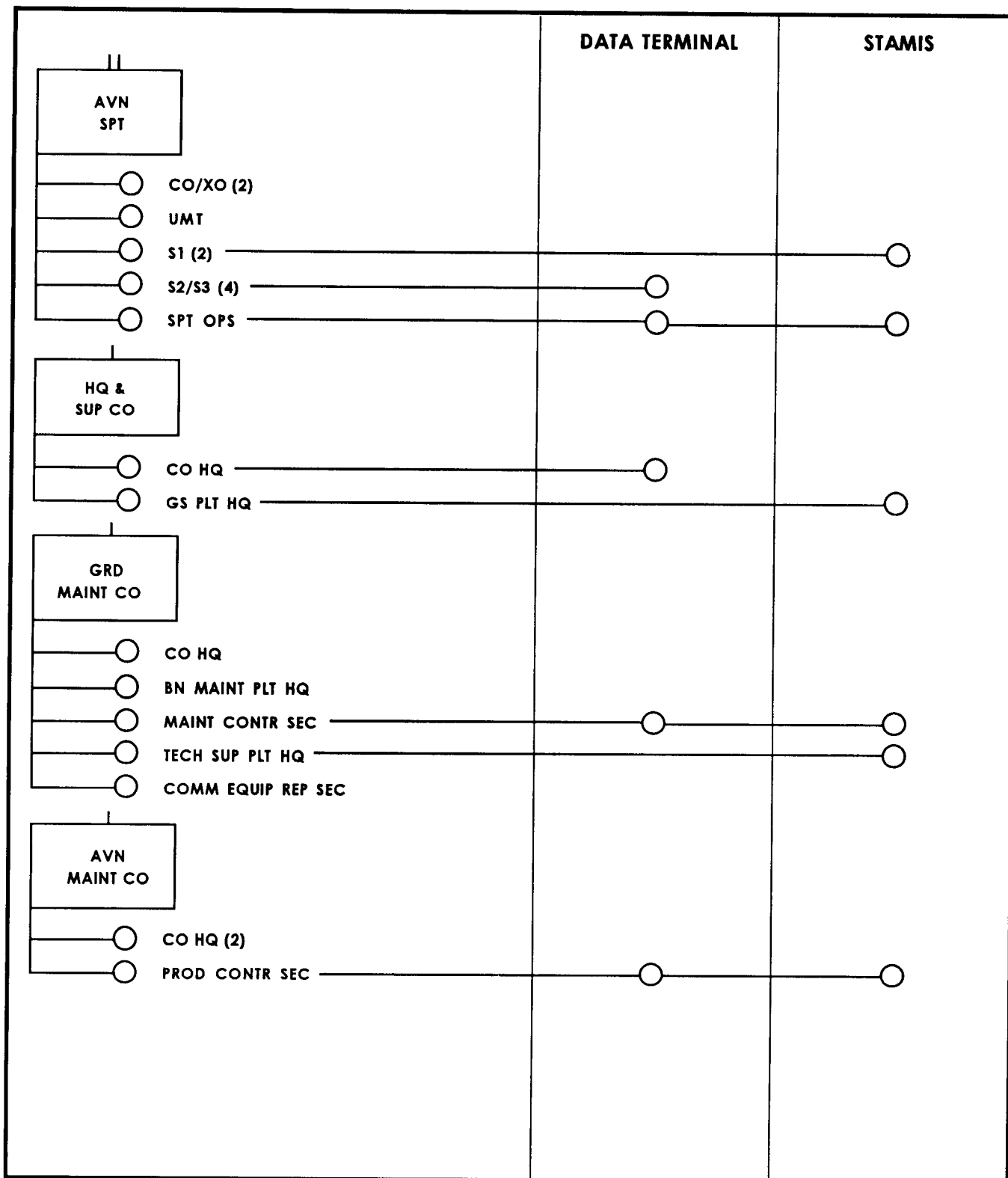**Figure 4-5. Division fixed subscriber terminals**

Figure 4-6. ASB subscriber terminal assignments, fixed and mobile
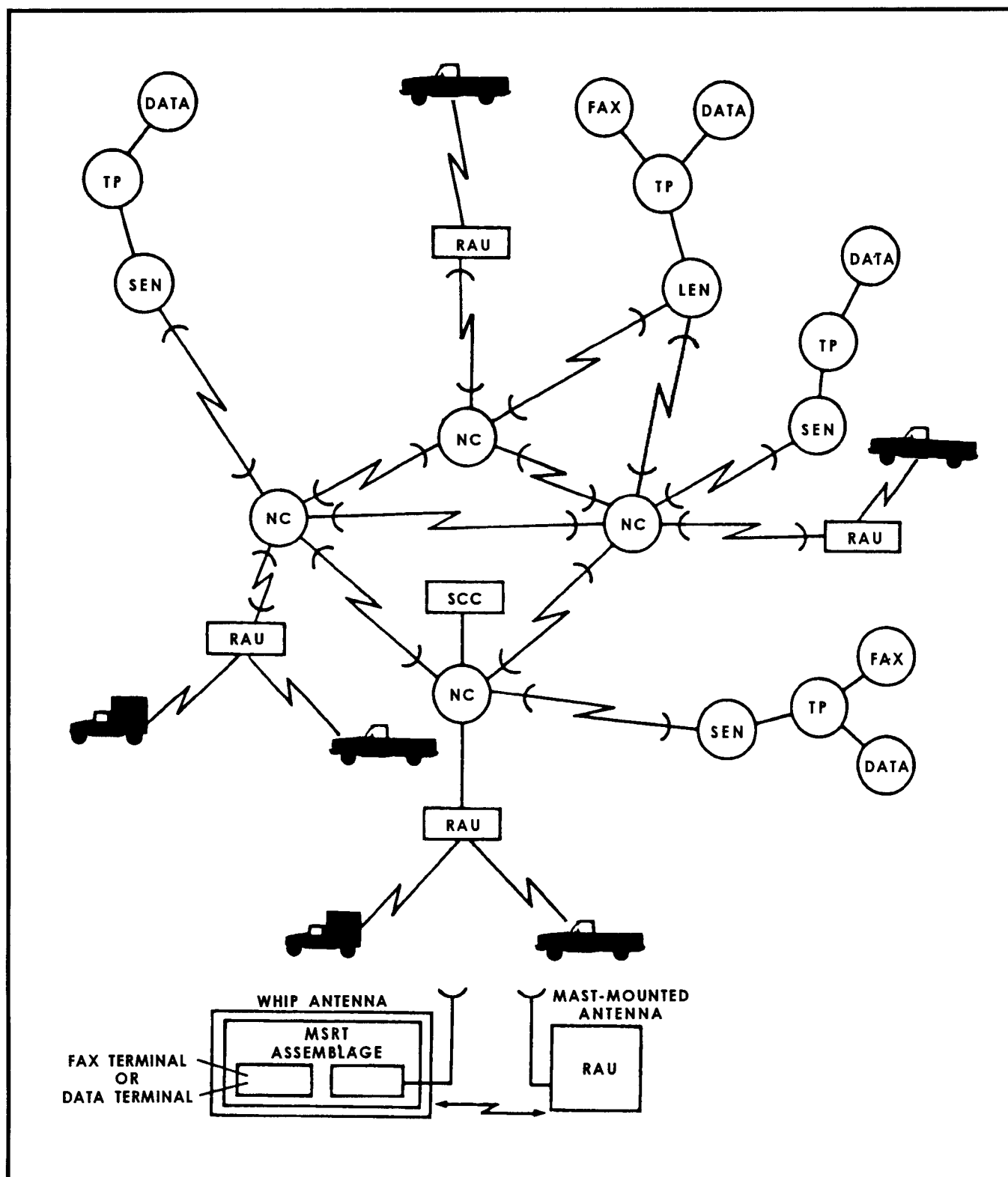
Figure 4-7. Mobile subscriber interface

ASB RADIO NETS

ASB COMMAND/OPERATIONS NET

The principal radio net operated by the ASB headquarters is the ASB command/operations net (see Figure 4-8). This is the net used for command and control of ASB elements, both from a command standpoint and from a CSS mission perspective. Its net control station is the S2/S 3 site in the CP. Locating the ASB CP near the aviation brigade rear CP may help to overcome perpetual shortfalls in

radios. This may also allow the support operations section access to the AB administrative/logistics net. The S2/S3 section also has access to the AB command net, which is also used for rear operations.

In addition, headquarters personnel/sections also monitors the section/net as shown in Table 4-1.
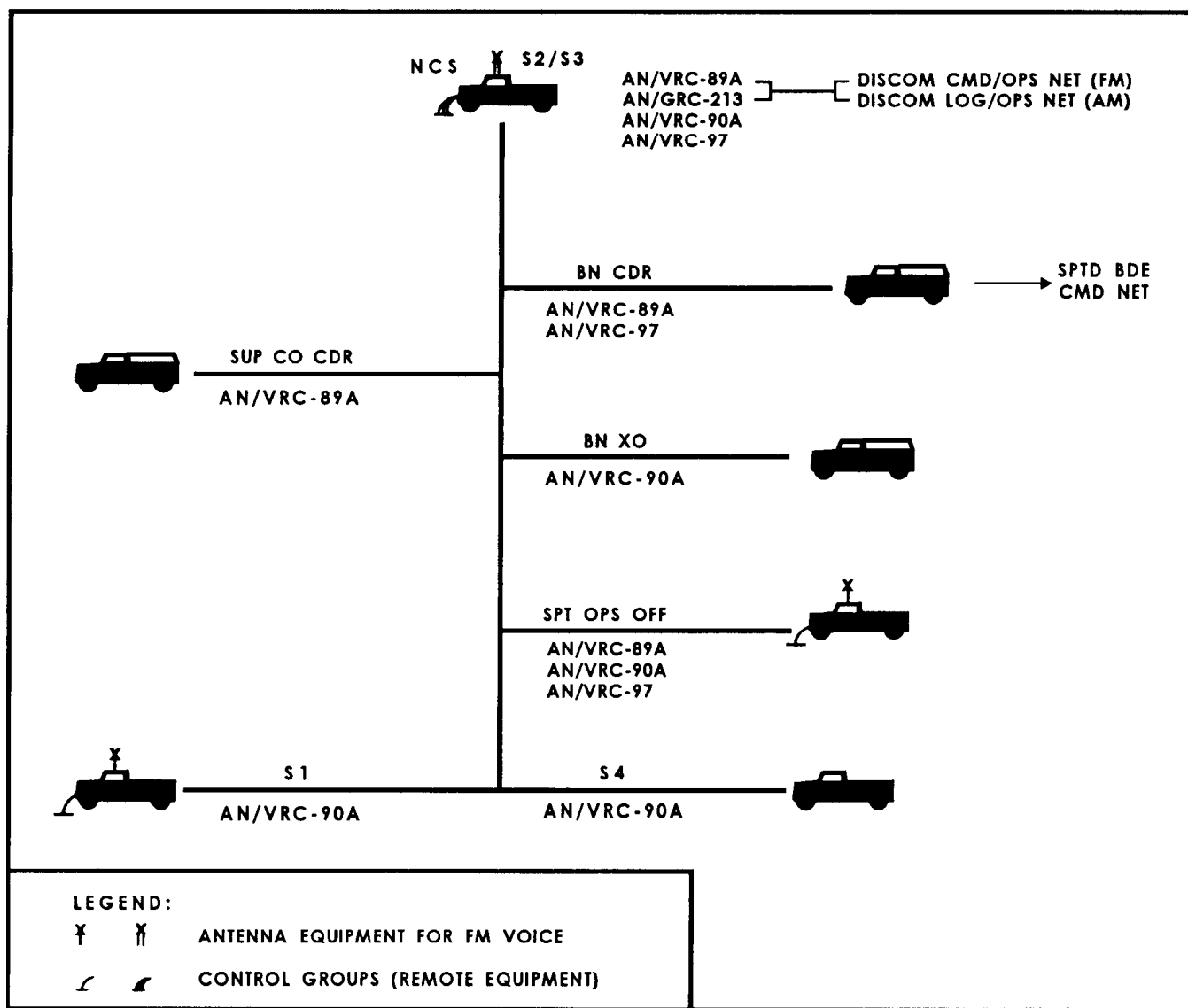

NCS   S2/S3

AN/VRC-89A
AN/GRC-213 ─── DISCOM CMD/OPS NET (FM)
AN/VRC-90A   DISCOM LOG/OPS NET (AM)
AN/VRC-97

BN CDR
AN/VRC-89A
AN/VRC-97   → SPTD BDE CMD NET

SUP CO CDR
AN/VRC-89A

BN XO
AN/VRC-90A

SPT OPS OFF
AN/VRC-89A
AN/VRC-90A
AN/VRC-97

S1   S4
AN/VRC-90A   AN/VRC-90A

LEGEND:
Ψ Ψ   ANTENNA EQUIPMENT FOR FM VOICE
ᴄ ᴄ   CONTROL GROUPS (REMOTE EQUIPMENT)

Figure 4-8. ASB command/operations net, FM (SINCGARS)

Table 4-1. Command section/net

SECTION	NET
• ASB commander (in vehicle)	• DISCOM command/operations net
• Support operation section	• Brigade administrative/logistics net (remote to ASB command net radio in S2/S3 tent with AN-GRA-39)
• S2/S3 section	• DISCOM command/operations net AB command net

HEADQUARTERS AND SUPPLY COMPANY COMMAND NET

This command net provides C2 for both the company headquarters and the supply company. When MSE is deployed, an MSRT locates at the nearest ATP, providing access to the corps Class V structure. Figure 4-9, page 4-12 shows the net.

GROUND MAINTENANCE COMPANY COMMAND NET

Figure 4-10, page 4-12 shows the ground maintenance company net, which provides C2 for its maintenance elements operating throughout the ASB's area of responsibility. Elements of this net must closely coordinate customer radio frequencies to meet on customer nets.

AVIATION MAINTENANCE COMPANY NET

This net is used for C2 of aviation maintenance elements operating under the ASB. The net (Figure 4-11, page 4-13) is essential for AVIM (and backup AVUM) support for the aviation brigade.

SIGNAL SECURITY

As part of the overall operations security program, ASB elements must consistently practice signal security. A vital consideration is siting of transmitting antennas. Sites must permit communication while reducing the enemy's ability to intercept and locate transmissions. Considerations include—

• Remote antennas away from CPs by at least 1 kilometer.

• Construct and use directional antennas.

• Use terrain features like hills, vegetation, and buildings to mask transmissions.

• Disperse transmitters.

• Maintain radio or radio listening silence; use radio only when absolutely necessary.

• Distribute codes on a need-to-know basis.

• Use only authorized call signs and brevity codes.

• Use wire and messengers whenever feasible.

• Use available secure communications security (COMSEC) devices.

• Maintain net discipline and control.

• Use authentication and encryption codes specified in the current signal operation instructions (S0I).

• Keep transmissions short (less than 20 seconds).

• Report all COMSEC discrepancies to the net control station (NCS).

• Use lowest transmitter power output consistent with good communications.

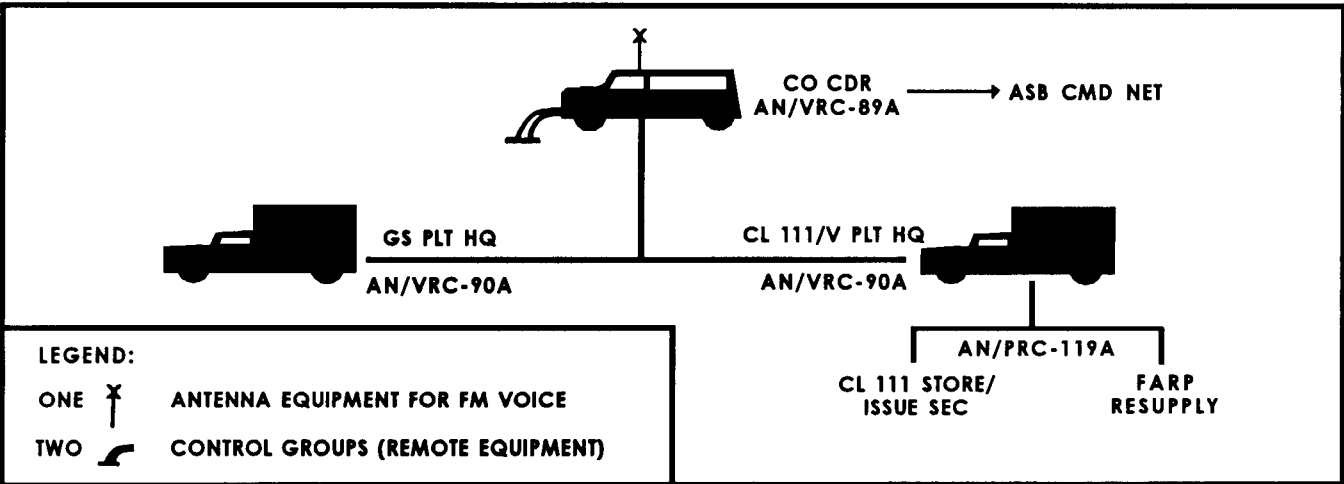• Avoid significant surges in traffic on single-channel radio nets.
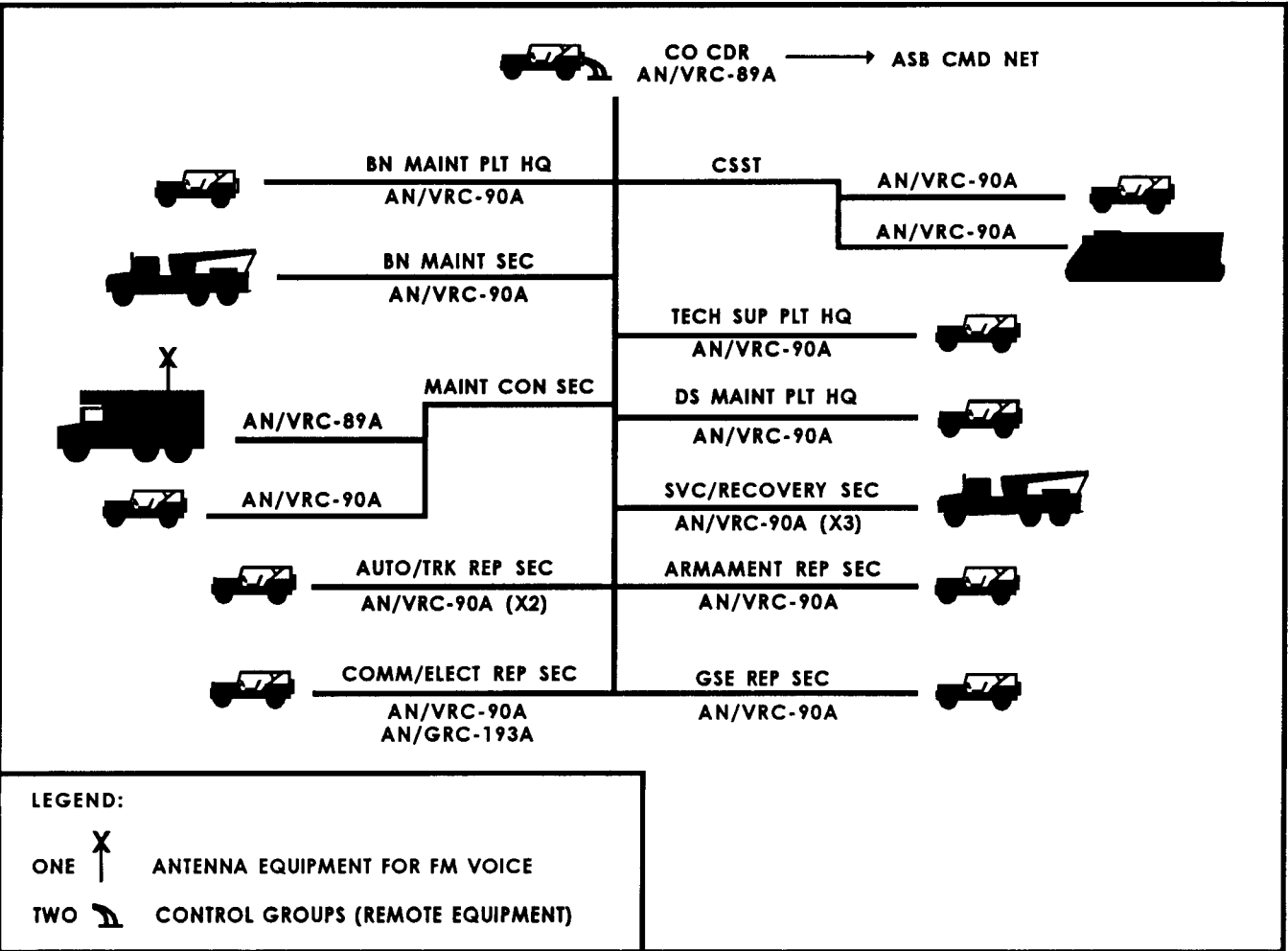
Figure 4-9. HSC command net, FM (SINCGARS)

LEGEND:

ONE ⋔ ANTENNA EQUIPMENT FOR FM VOICE

TWO ⌐ CONTROL GROUPS (REMOTE EQUIPMENT)

CO CDR AN/VRC-89A → ASB CMD NET

GS PLT HQ AN/VRC-90A

CL 111/V PLT HQ AN/VRC-90A

AN/PRC-119A

CL 111 STORE/ISSUE SEC   FARP RESUPPLY

Figure 4-10. Ground maintenance company (GMC) command net, FM (SINCGARS)

CO CDR AN/VRC-89A → ASB CMD NET

BN MAINT PLT HQ AN/VRC-90A

CSST AN/VRC-90A AN/VRC-90A

BN MAINT SEC AN/VRC-90A

TECH SUP PLT HQ AN/VRC-90A

MAINT CON SEC AN/VRC-89A

DS MAINT PLT HQ AN/VRC-90A

AN/VRC-90A

SVC/RECOVERY SEC AN/VRC-90A (X3)

AUTO/TRK REP SEC AN/VRC-90A (X2)

ARMAMENT REP SEC AN/VRC-90A

COMM/ELECT REP SEC AN/VRC-90A AN/GRC-193A

GSE REP SEC AN/VRC-90A

LEGEND:

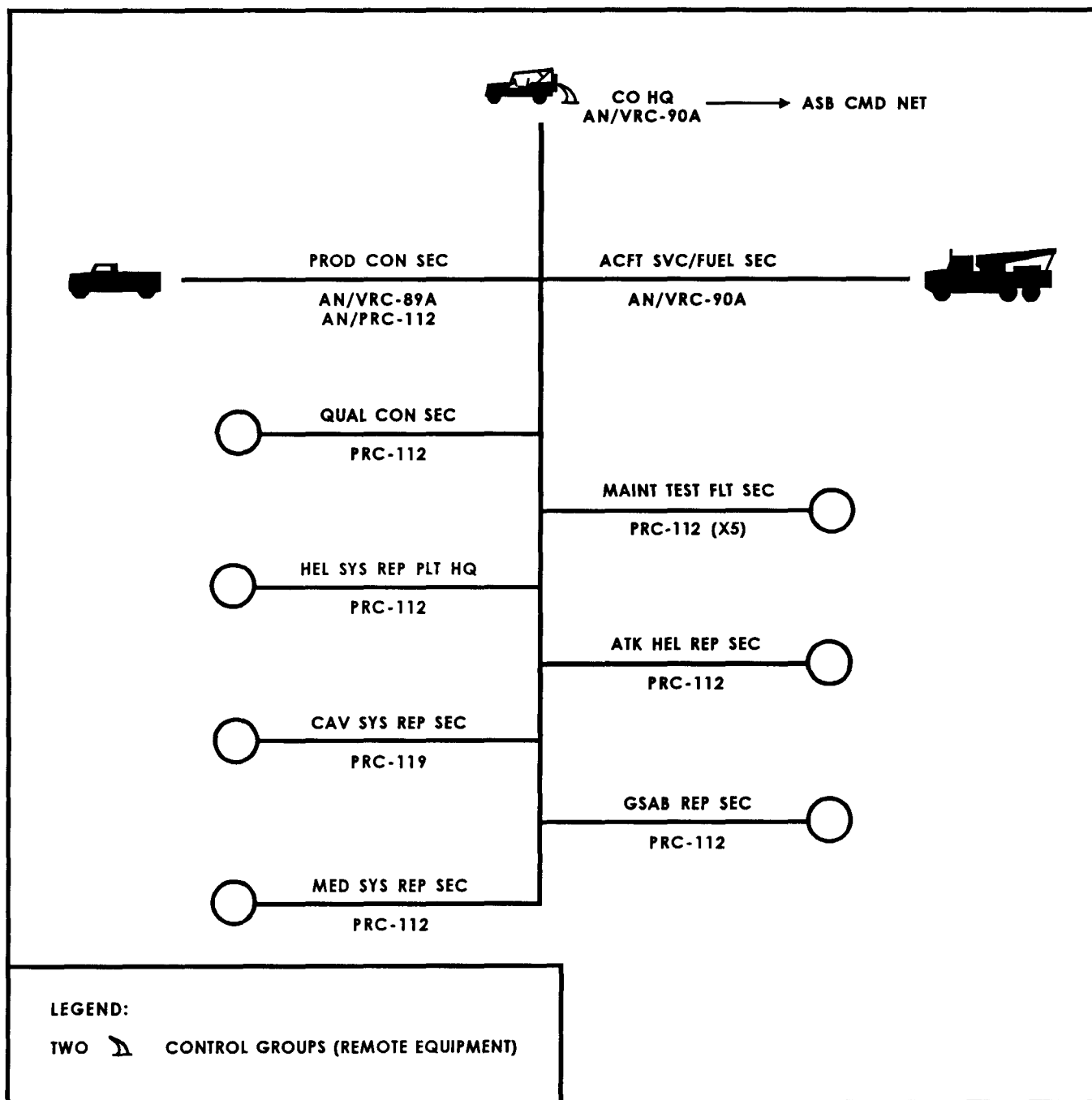ONE ⋔ ANTENNA EQUIPMENT FOR FM VOICE

TWO ⌐ CONTROL GROUPS (REMOTE EQUIPMENT)

Figure 4-11. Sample AMC command net (SINCGARS)